

$\Sigma(2250)$ $I(J^P) = 1(?)$ Status: ***

Results from partial-wave analyses are too weak to warrant separating them from the production and cross-section experiments. LASINSKI 71 in $\bar{K}N$ using a Pomeron + resonances model, and DEBELLEFON 76, DEBELLEFON 77, and DEBELLEFON 78 in energy-dependent partial-wave analyses of $\bar{K}N \rightarrow \Lambda\pi$, $\Sigma\pi$, and NK , respectively, suggest two resonances around this mass.

NODE=B048

 $\Sigma(2250)$ MASS

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
2210 to 2280 (≈ 2250) OUR ESTIMATE			
2270±50	DEBELLEFON 78	DPWA	D_5 wave
2210±30	DEBELLEFON 78	DPWA	G_9 wave
2275±20	DEBELLEFON 77	DPWA	D_5 wave
2215±20	DEBELLEFON 77	DPWA	G_9 wave
2300±30	¹ DEBELLEFON 75B	HBC	$K^- p \rightarrow \Xi^{*0} K^0$
2251 ₋₂₀ ⁺³⁰	VANHORN 75	DPWA	$K^- p \rightarrow \Lambda\pi^0, F_5$ wave
2280±14	AGUILAR-...	70B	HBC $K^- p$ 3.9, 4.6 GeV/c
2237±11	BRICMAN 70	CNTR	Total, charge exchange
2255±10	COOL 70	CNTR	$K^- p, K^- d$ total
2250± 7	BUGG 68	CNTR	$K^- p, K^- d$ total
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2260	DEBELLEFON 76	IPWA	D_5 wave
2215	DEBELLEFON 76	IPWA	G_9 wave
2250±20	LU 70	CNTR	$\gamma p \rightarrow K^+ Y^*$
2245	BLANPIED 65	CNTR	$\gamma p \rightarrow K^+ Y^*$
2299± 6	BOCK 65	HBC	$\bar{p}p$ 5.7 GeV/c

NODE=B048M

NODE=B048M
→ UNCHECKED ←

OCCUR=2

OCCUR=2

 $\Sigma(2250)$ WIDTH

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
60 to 150 (≈ 100) OUR ESTIMATE			
120±40	DEBELLEFON 78	DPWA	D_5 wave
80±20	DEBELLEFON 78	DPWA	G_9 wave
70±20	DEBELLEFON 77	DPWA	D_5 wave
60±20	DEBELLEFON 77	DPWA	G_9 wave
130±20	¹ DEBELLEFON 75B	HBC	$K^- p \rightarrow \Xi^{*0} K^0$
192±30	VANHORN 75	DPWA	$K^- p \rightarrow \Lambda\pi^0, F_5$ wave
100±20	AGUILAR-...	70B	HBC $K^- p$ 3.9, 4.6 GeV/c
164±50	BRICMAN 70	CNTR	Total, charge exchange
230±20	BUGG 68	CNTR	$K^- p, K^- d$ total
• • • We do not use the following data for averages, fits, limits, etc. • • •			
100	DEBELLEFON 76	IPWA	D_5 wave
140	DEBELLEFON 76	IPWA	G_9 wave
170	COOL 70	CNTR	$K^- p, K^- d$ total
125	LU 70	CNTR	$\gamma p \rightarrow K^+ Y^*$
150	BLANPIED 65	CNTR	$\gamma p \rightarrow K^+ Y^*$
21 ₋₂₁ ⁺¹⁷	BOCK 65	HBC	$\bar{p}p$ 5.7 GeV/c

NODE=B048W

NODE=B048W
→ UNCHECKED ←

OCCUR=2

OCCUR=2

OCCUR=2

 $\Sigma(2250)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 N\bar{K}$	<10 %
$\Gamma_2 \Lambda\pi$	seen
$\Gamma_3 \Sigma\pi$	seen
$\Gamma_4 N\bar{K}\pi$	
$\Gamma_5 \Xi(1530)K$	

NODE=B048215;NODE=B048

DESIG=1;OUR EST
 DESIG=2;OUR EST
 DESIG=3;OUR EST
 DESIG=4
 DESIG=5

The above branching fractions are our estimates, not fits or averages.

$\Sigma(2250)$ BRANCHING RATIOS

See "Sign conventions for resonance couplings" in the Note on Λ and Σ Resonances.

$\Gamma(N\bar{K})/\Gamma_{\text{total}}$

VALUE	DOCUMENT ID	TECN	COMMENT
<0.1 OUR ESTIMATE			

0.08 ± 0.02

0.02 ± 0.01

DOCUMENT ID	TECN	COMMENT
DEBELLEFON 78	DPWA	D_5 wave
DEBELLEFON 78	DPWA	G_9 wave

Γ_1/Γ

NODE=B048220

NODE=B048220

NODE=B048R1
NODE=B048R1
→ UNCHECKED ←

OCCUR=2

$(J+\frac{1}{2}) \times \Gamma(N\bar{K})/\Gamma_{\text{total}}$

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

• • • We do not use the following data for averages, fits, limits, etc. • • •

DOCUMENT ID	TECN	COMMENT
BRICMAN 70	CNTR	Total, charge exchange
COOL 70	CNTR	$K^- p, K^- d$ total
BUGG 68	CNTR	

Γ_1/Γ

NODE=B048R7
NODE=B048R7

$(\Gamma_1\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(2250) \rightarrow \Lambda\pi$

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

-0.16 ± 0.03	VANHORN 75	DPWA	$K^- p \rightarrow \Lambda\pi^0, F_5$ wave
--------------	------------	------	--

• • • We do not use the following data for averages, fits, limits, etc. • • •

DOCUMENT ID	TECN	COMMENT
DEBELLEFON 76	IPWA	D_5 wave
DEBELLEFON 76	IPWA	G_9 wave
BARBARO-... 70	DPWA	$K^- p \rightarrow \Lambda\pi^0, G_9$ wave

$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$

NODE=B048R2
NODE=B048R2

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(2250) \rightarrow \Sigma\pi$

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

DOCUMENT ID	TECN	COMMENT
DEBELLEFON 77	DPWA	D_5 wave
DEBELLEFON 77	DPWA	G_9 wave
BARBARO-... 70	DPWA	$K^- p \rightarrow \Sigma\pi, G_9$ wave

$(\Gamma_1\Gamma_3)^{1/2}/\Gamma$

NODE=B048R3
NODE=B048R3

OCCUR=2

$\Gamma(N\bar{K})/\Gamma(\Sigma\pi)$

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

• • • We do not use the following data for averages, fits, limits, etc. • • •

DOCUMENT ID	TECN	COMMENT
BARNES 69	HBC	1 standard dev. limit

Γ_1/Γ_3

NODE=B048R4
NODE=B048R4

$\Gamma(\Lambda\pi)/\Gamma(\Sigma\pi)$

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

• • • We do not use the following data for averages, fits, limits, etc. • • •

DOCUMENT ID	TECN	COMMENT
BARNES 69	HBC	1 standard dev. limit

Γ_2/Γ_3

NODE=B048R5
NODE=B048R5

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\bar{K} \rightarrow \Sigma(2250) \rightarrow \Xi(1530)K$

VALUE	DOCUMENT ID	TECN	COMMENT
-------	-------------	------	---------

DOCUMENT ID	TECN	COMMENT
DEBELLEFON 75B	HBC	$K^- p \rightarrow \Xi^{*0} K^0$

$(\Gamma_1\Gamma_5)^{1/2}/\Gamma$

NODE=B048R6
NODE=B048R6

$\Sigma(2250)$ FOOTNOTES

¹ Seen in the (initial and final state) D_5 wave. Isospin not determined.

$\Sigma(2250)$ REFERENCES

DEBELLEFON 78	NC 42A 403	A. de Bellefon <i>et al.</i>	(CDEF, SACL) IJP	REFID=31968
DEBELLEFON 77	NC 37A 175	A. de Bellefon <i>et al.</i>	(CDEF, SACL) IJP	REFID=31985
DEBELLEFON 76	NP B109 129	A. de Bellefon, A. Berthon	(CDEF) IJP	REFID=32158
Also	NP B90 1	A. de Bellefon <i>et al.</i>	(CDEF, SACL) IJP	REFID=32425
DEBELLEFON 75B	NC 28A 289	A. de Bellefon <i>et al.</i>	(CDEF, SACL)	REFID=32003
VANHORN 75	NP B87 145	A.J. van Horn	(LBL) IJP	REFID=32093
Also	NP B87 157	A.J. van Horn	(LBL) IJP	REFID=32094
LASINSKI 71	NP B29 125	T.A. Lasinski	(EFI) IJP	REFID=32002
AGUILAR-... 70B	PRl 25 58	M. Aguilar-Benitez <i>et al.</i>	(BNL, SYRA)	REFID=20692
BARBARO-... 70	Duke Conf. 173	A. Barbaro-Galtieri	(LRL) IJP	REFID=31777
Hyperon Resonances, 1970				
BRICMAN 70	PL 31B 152	C. Bricman <i>et al.</i>	(CERN, CAEN, SACL)	REFID=31872
COOL 70	PR D1 1887	R.L. Cool <i>et al.</i>	(BNL) I	REFID=31529
Also	PRL 16 1228	R.L. Cool <i>et al.</i>	(BNL) I	REFID=31861
LU 70	PR D2 1846	D.C. Lu <i>et al.</i>	(YALE)	REFID=31978
BARNES 69	PRL 22 479	V.E. Barnes <i>et al.</i>	(BNL, SYRA)	REFID=32340
BUGG 68	PR 168 1466	D.V. Bugg <i>et al.</i>	(RHEL, BIRM, CAVE) I	REFID=31601
BLANPIED 65	PRL 14 741	W.A. Blanpied <i>et al.</i>	(YALE, CEA)	REFID=32413
BOCK 65	PL 17 166	R.K. Bock <i>et al.</i>	(CERN, SACL)	REFID=31971